

Application No. 10/026,055
Amendment to Office Action dated December 28, 2004
Reply to Office Action mailed September 28, 2004

REMARKS

Introduction

The present Amendment is in response to the Office Action mailed September 28 2004. The Office Action rejected claims 1-4 and allowed claims 5-6. Reconsideration of the application is respectfully requested in view of the following remarks. Please note that the following remarks are not intended to be an exhaustive enumeration of the distinctions between any cited references and the claimed invention. Rather, the distinctions identified and discussed below are presented solely by way of example to illustrate some of the differences between the claimed invention and the cited references. In addition, Applicants request that the Examiner carefully review any references discussed below to ensure that Applicants understanding and discussion of the references, if any, is consistent with the Examiner's understanding. For the Examiner's convenience and reference, Applicant's remarks are presented in the order in which the corresponding issues were raised in the Office Action.

Rejections Under 35 U.S.C. § 103

A *prima facie* case of obviousness must satisfy three basic criteria. First, there must be some suggestion or motivation to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference or references must teach or suggest all the claim limitations. See MPEP 2143. The following discussion illustrates that the *prima facie* case of obviousness is not satisfied for the pending claims.

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Rejection of Claims 1-2 under 35 U.S.C. § 103(a)

The Office Action rejected claims 1-2 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,046,096 (Ouchi) in view of U.S. Patent No. 6,008,525 (Barron). The Office Action suggests that Ouchi shows an active region comprising one 5 nm thick InGaAs quantum well and GaAs barrier layers and that Barron teaches GaAs confinement layers. Claim 1, as originally filed on December 20, 2001, required both "GaAsN barrier layers . . ." and "GaAsN confinement layers . . ." In the Reply and Request for Reconsideration filed by a previous attorney on March 10, 2003, the amendment to claim 1 recited "GaAs barrier layers" and "GaAs confinement layers". The "N" in "GaAsN" was not explicitly deleted from claim 1 in the response filed March 10, 2003, but appears to have been accidentally omitted.

Although claim 1 has the identifier of "Currently Amended" in this paper, Applicants are in fact restoring what was apparently omitted by mistake. Applicants therefore do not believe this to be an amendment to claim 1. The requirements of "GaAsN barrier layers" and "GaAsN confinement layers" were in the original claims and have been restored to claim 1 by this paper.

Claim 1 now requires "GaAsN barrier layers" and "GaAsN confinement layers". In the Office Action, the Examiner has indicated that claims 5 and 6 are allowable because the prior art of Ouchi, Takahashi, and Barron fail to teach GaAsN confinement layers sandwiching the active region. As a result, claims 1 and 2, which require GaAsN confinement layers, are believed to be in condition for allowance for at least the same reason and allowance thereof is respectfully requested.

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Rejection of Claims 3-4 under 35 U.S.C. § 103(a)

The Office Action rejected claims 3-4 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. 2003/0039287 (Takahashi) in view of Barron.

Claim 3 requires "GaAsN barrier layers sandwiching said at least one quantum well" and the Office Action alleges that this is taught by Takahashi. Applicants respectfully traverse.

While claim 3 requires GaAsN barrier layers sandwiching said at least one quantum well, the barrier layers taught by Takahashi are not all GaAsN. For example, Takahashi teaches "InGaAs well layers (14a) and (14b) . . . "a lower barrier layer (13), an intermediate barrier layer (15), an upper barrier layer (16) and a buried layer (18) of GaAsN based materials." See abstract. The lower barrier layer (13) is GaAsN. See ¶¶[0079-80]. The intermediate barrier layer (15) is GaAsN as well. See ¶¶[0085-86]. The upper barrier layer (16), however, is not GaAsN, but is GaAsNO. See ¶¶[0088-89]. Because some of the well layers of Takahashi are sandwiched by GaAsN and GaAsNO, Takahashi does not teach GaAsN barrier layers sandwiching said at least one quantum well.

Claim 3 is further directed to a vertical cavity surface emitting laser. The teachings of Takahashi are directed to a gain coupled distributed feedback (DFB) semiconductor laser. This is evident in Figure 1 of Takahashi, which illustrates the cross sectional structure of the gain diffraction grating for a DFB laser. A review of the structure illustrated in Figure 1 illustrates that the well layers are not sandwiched, but that the well layers are surrounded on the sides as well. More specifically, Takahashi teaches that the "well layer 14 . . . is enclosed by the barrier layers 13, 15, and 16 and

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the buried layer 18" See ¶¶[0111]. The requirement of GaAsN barrier layers sandwiching said at least one quantum well in claim 3 is not taught or suggested by an enclosed well layer in a gain diffraction grating used in a DFB laser.

In sum, Takahashi is directed to DFB lasers while claim 3 is directed to a vertical cavity surface emitting laser. Takahashi further teaches enclosing the well layer with barrier layers while claim 3 requires GaAsN barrier layers sandwiching said at least one quantum well. In addition, Takahashi includes a barrier layer that is not GaAsN, but is instead GaAsNO. As a result, the well layers taught by Takahashi are not sandwiched by GaAsN barrier layers because of the GaAsNO barrier layer.

The Office Action relied on Barron to teach AlGaAs confinement layers. Assuming, *arguendo*, that this is true, claim 3 is not obvious in view of Takahashi over Barron for the reasons discussed above regarding Takahashi. For example, Barron does not teach GaAsN barrier layers sandwiching said at least one quantum well. Further, Barron is not directed to a vertical cavity surface emitting laser but instead teaches a "ridge waveguide diode with bare facets". See col. 5, lines 14-16. For at least these reasons, claims 3-4 are believed to be in condition for allowance, which is respectfully requested.

The Office Action also suggested that the inherency to support the quantum well having a depth of at least 40 meV is Figure 14.3 of the book of Electronic Material Science. Applicants do not admit that Figure 14.3 inherently supports a quantum well having a depth of at least 40 meV. More particularly, Claims 1 and 3 each require InGaAs quantum wells, but Figure 14.3 does not identify or plot the Energy Gap of InGaAs.

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Allowable Subject Matter

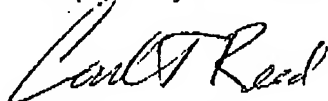
Claims 5-6 have been allowed. The Applicant concurs with the Examiner's conclusion that the prior art does not suggest or render obvious the claimed invention. However, Applicant submits that it is the claim as a whole, rather than any particular limitation, that makes the claims in the above-identified application allowable. No single limitation should be construed as the reason for allowance of a claim because it is each of the elements of the claim that distinguish the claim from the prior art and make it allowable.

Conclusion

In the event that the Examiner finds remaining impediment to a prompt allowance of this application that may be clarified through a telephone interview, the Examiner is requested to contact the undersigned attorney.

Dated this 28th day of December, 2004.

Respectfully submitted,



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